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Docket No.: 043888-0309

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Customer Number: 53080  
: :  
Yuu INATOMI, et al. : Confirmation Number: 5354  
: :  
Application No.: 10/814,342 : Group Art Unit: 1795  
: :  
Filed: April 01, 2004 : Examiner: DOVE, TRACY MAE  
: :  
For: ELECTRODE AND ELECTROCHEMICAL DEVICE USING THE SAME

## REPLY BRIEF PURSUANT TO 37 C.F.R. § 41.41

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. § 41.41, the following Remarks are respectfully submitted in response to the Examiner's Answer dated July 20, 2009. Appellants reassert all arguments contained in the Principal Brief.

## CERTIFICATION OF FACSIMILE TRANSMISSION

I HEREBY CERTIFY THAT THIS PAPER IS BEING  
FACSIMILE TRANSMITTED TO THE PATENT AND  
TRADEMARK OFFICE ON THE DATE SHOWN BELOW

Nathaniel A. McQueen  
TYPE OR PRINT NAME OF PERSON SIGNING CERTIFICATION  
[Signature] Sept. 21, 2009  
SIGNATURE DATE

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**Reply to Examiner's Answer**

In the Examiner's Answer, the Examiner replies to arguments set forth in the Appeal Brief filed on May 11, 2009 in the "Response to Arguments". Applicants respond to the Response to Arguments as follows.

In the Response to Arguments section on pages 7-8, with regard to the argument that Nakahara fails to teach or suggest a carbonaceous material covalently bonded to a radical compound, the Examiner states that because Applicants admit that a carbonaceous material can be readily bonded with organic groups via a covalent bond and that carbonaceous groups have many surface functional groups, it is inherent that Nakahara teaches covalent bonding between the radical groups and the carbonaceous groups. Applicants respectfully disagree.

As was stated in the Appeal Brief, the active material of Nakahara '964 is chemically bonded to the current collector, not that radical groups in the active material are covalently bonded to the carbonaceous groups of the active material. In addition, it was also stated that it is well known in the art that the mere mixing of chemical compounds does not necessarily result in the formation of covalent bonds. As we stated, often, heat, light, stirring or a catalyst must be employed in order to create covalent bonds between compounds. For example, in Example 1 of the present disclosure, covalent bonds are formed by performing an immobilization treatment (ozone treatment). An ozone treatment enables most of the functional groups on the active carbon to be substituted with hydroxyl groups that are capable of forming covalent bonds.

In order to form covalent bonds between an active carbon having hydroxyl groups and a radical compound, the radical compound needs a highly reactive site capable of forming covalent

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bonds by reacting with hydroxyl groups. For example, SiX, TiX, or isocyanate groups couple with OH groups to form a silane coupling reaction.

In contrast, Nakahara '964 and '697 do not mention a radical compound having a covalent bond site. As such, covalent bonds are impossible in Nakahara '964 and '697 by merely mixing the compounds with a carbonaceous material that has not undergone ozone treatment. Further, since a carbon-carbon double bond is relatively low in reactivity, even if the radical compound of Nakahara has a carbon-carbon double bond, covalent bonds cannot be formed without performing an ozone treatment on the active carbon. This would be akin to attempting to convert ethylene into polyethylene without the use of uv light or other such treatment.

As is shown in Table 1 of the specification, the battery of Example 1, which uses an ozone treatment, has better cycle characteristics than Comparative Example 1, which does not use an ozone treatment. As such, the Examples show that the formation of covalent bonds significantly improves life cycle characteristics of batteries.

Nakahara '964 (as shown in Example 1, col. 49, lines 24-34) and Nakahara '697 (Example 1, col. 10, line 66 – col. 11, line 2) only show that the radical compound and the graphite are mixed together without any immobilization treatment or any other polymerization step. Both of these examples are similar to Comparative Example 1 of the present example. Therefore, the Examiner's statement that "the covalent bond limitation of the claimed invention is inherent in the teachings of Nakahara '964 and '697 because the references teach an organic radical compound mixed with a carbonaceous material" is not a reasonable conclusion. Moreover, the Examiner's arguments against the excellent discharge characteristics of the

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present disclosure being moot because the compounds of Nakahara have not been properly compared to the present disclosure has been overcome by showing that the present disclosure properly compares the Nakahara references with the Examples of the present disclosure.

In addition, col. 25, lines 1-3 of Nakahara '964 states "in this invention, a conductive auxiliary material or ion-conductive auxiliary material may be added for reducing an impedance during forming an electrode layer comprising a radical compound."

However, covalent bonding of a conductive auxiliary material to a radical compound would not increase the impedance of an electrode layer including a conductive auxiliary material and a radical compound. The presence of a conductive auxiliary material between active material particles (radical compound) enables improvement in electron conductivity between active material particles as well as reduction in carbon resistance. Accordingly, as the conductive auxiliary material (which includes carbonaceous particles) would not reduce impedance during the formation of the electrode layer if the compound is covalently bonded to the radical compound, it suggests that covalent bonds are not formed in Nakahara.

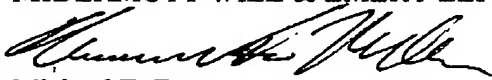
In view of the above arguments and those set forth in the Appeal Brief, Applicants have demonstrated that the combination of Nakahara et al. (USP No. 6,866,964) and Nakahara et al. (USP No. 7,226,697) is improper. Appellants respectfully submit that the Examiner's rejections under 35 U.S.C. § 103 are not legally viable. Appellant, therefore, respectfully solicits the Honorable Board to reverse the Examiner's rejections of claims 8, 11 and 12 under 35 U.S.C. § 103(a) for obviousness predicated upon Nakahara '964 and Nakahara '697.

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To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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